User's Guide to
M1230XA
68030 CPU, FPU, 32-Bit Memory, and Clock for the Amiga® 1200
from
PARAVISION, INC.

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GENERAL DESCRIPTION

M1230 XA is a high speed 50MHz 68030 accelerator and memory card which employs the Motorola 68882 as a math co-processor. Optionally, a 33MHz 68030 or 40MHz EC 030 can be supported. Also supported is the addition of up to 128 megabytes of 32-bit wide RAM via the installation of an optional SIMM (Single Inline Memory Module) bearing 1,2,4,8,16,32,64, or 128 megs of memory. Finally, the board supports a battery-backed real time clock circuit to provide system date and time for file date-stamping.

STARTING INSTALLATION INSTRUCTIONS

Shut down your Amiga 1200 and remove the power cord from the back of the Amiga. Turn your 1200 over on its keyboard so that you can easily access the hatch in the bottom of the machine. Open the plastic hatch on the bottom of the Amiga. In good light, closely examine the physical layout of the expansion bay in your Amiga.

BASIC M1230 XA INSTALLATION

1. Examine your M1230 XA (holding it by its edges) paying particular attention to the jumper settings on your board (jumpers are little black plastic blocks that slip over some of the upright, brass colored pins on your board; they "tell" M1230 XA some of its configuration information). Take a look at the M1230 XA diagram in this documentation. Make sure your jumpers are set correctly.

2. Keeping the cpu/fpu side of the board facing outwards from the Amiga, insert the M1230 XA into the expansion bay. Note that you'll have to maneuver it into the bay since the connector end is wider than the bay opening.

3. Line up the black edge-card connector with the expansion card-edge on your Amiga. Lightly press it onto the card edge and make sure it is properly lined up. Then firmly press it completely onto the card edge. Because the connector is so wide, it may require some strength to press the card onto the Amiga's bus. Because the space is so tight, you may have to use the big CPU socket as a gripping edge for your fingers. If you do so, be sure to keep the pressure in a straight line with the board.

4. Replace the plastic hatch and turn your Amiga back over. Your M1230 XA is now essentially ready to use although you may have to run the configuration software (SetXA) if you've installed any components of your own such as memory or a faster CPU.

5. From the included diskette of software, copy the SetXA program into the Utilities drawer of your system disk and, if you have memory on your M1230 XA board, copy the AddXAMem icon into your WBStartup drawer.

INSTALLING SIMM MEMORY

Only by having its own, wide memory installed will the M1230 XA give you the full benefit of its faster processor. If you or your dealer are installing a SIMM into M1230 XA this must be done by removing the M1230 XA from the Amiga (since the SIMM socket is on the "inboard" side of the XA). Make sure the power is off and the power cable removed from the back of the Amiga before proceeding. Handle the SIMM by its side edges. Rest the card edge side of the SIMM in the SIMM socket with the notched side of the SIMM on the "keyed" side of the connector. Press down firmly on the top edge of the SIMM with both thumbs; then press the SIMM forward to snap it into place (pushing it past the metal retaining clips). Should you need to remove the SIMM, simply use your thumbs to squeeze open the metal clips (pressing them outwards towards the side of the SIMM connector). The SIMM will pop up when released.

If you or your dealer are purchasing a SIMM from a source other than PARAVISION, INC., you must be certain to get the correct type. M1230 XA does NOT use the common, 8-bit SIMM as found in the Macintosh marketplace. Rather it uses the same sort of SIMM as used in the Amiga 4000. This is a 72-pin, 32-bit wide SIMM. M1230 XA needs at least a 100ns SIMM. You can use a 80ns, 70ns, 60ns, or even 40ns SIMM but these may cost more. The following is a list of Micron part numbers for the correct SIMM. You can use the equivalent parts from any good quality manufacturer.

M1230 XA SIMM SPECIFICATION (example only): 80ns, 72-pin "wide-body" SIMM organized N-megabytes x 32 bits. For example, Micron MT8D25632 (one megabyte); MT16D51232 (two megabytes); MT8D132 (four megabytes); and MT16D232 (eight megabytes).

MATH COPROCESSORS

The Motorola Floating Point Unit 68882 is supported on the M1230 XA. The board may be supplied with a 33 or 50MHz 68882. An FPU upgrade kit (consisting of the math chip and appropriate crystal) is available from PARAVISION. Unless you have a PGA chip pulling tool, it is best to leave the removal of the installed math chip to a technician. The operation of a properly installed math chip is transparent to the user running under AmigaDOS 3.0. The FPU provides a significant performance increase when running software which is computationally intense; particularly that software which makes heavy use of transcendentals and a choice, be sure to operate it in 881/882 mode for good performance.

IMPORTANT: Note that the math chips compatible with M1230 XA must be PGA (Pin Grid Array) style.

J1 JUMPER SETTINGS: When running the math chip clocked at the same speed as the CPU, the J1 jumper block is on the two pins towards the end of the board (pins 2 and 1; see diagram). When a faster or slower math chip and oscillator are installed, this jumper is moved to the inner two pins (pins 3 and 2). Do NOT over-clock a math chip (not even a little bit) -doing so may damage the chip over time, cause inaccuracies, and will void your warranty.

REALTIME CLOCK

The M1230 XA also provides a realtime, battery backed clock. This clock uses the AmigaDOS Date and SetClock routines. See your DOS manual for details. The coin-cell lithium battery will last a very long time. Should you ever have to replace it, use an equivalent lithium cell (3 volts; CR 2032). Such batteries are widely available. Be sure that the "+" on the battery is facing outwards.

IMPORTANT NOTE: If you should have an Amiga 1200 with

another real time clock installed on the motherboard, you should disable the M1230 XA real time clock by removing the clock chip from the M1230 XA. The clock chip is the small, rectangular, socketed chip found approximately mid-way between the CPU chip and the edge connector (see the diagram). Use a small, flat bladed screwdriver to carefully pry out the chip. You should also remove the battery.

CLARIFICATION: Don't confuse this real time clock with references to "clock speed" in the context of cpu or math chip cycle rates. The two sorts of "clocks" are entirely unrelated.

INCLUDED SOFTWARE

The included software utility, SetXA, permits you to control the settings in the EEPROM chip onboard the M1230 XA. A second, memory resident utility (AutoXA) is provided for those who wish to configure memory very early in a warm reboot (see the AutoXA.Readme file on the diskette). Also included is the highly-respected MBRTest-2 utility which you can use to test your A1200 motherboard memory as well as your XA FastRAM. See the relevant text file on the diskette for MBRTest-2.

INSTALLING AND USING SetXA

Using the mouse, drag/copy the two files named SetXA and AddXAMem onto your system disk. Put SetXA into your Utilities drawer and AddXAMem into your WBStartup drawer (if you have memory installed on the M1230 XA).

Under AmigaDOS 3.0, the memory on M1230 XA must be added to the system memory list via a software call to SetXA. This call is done automatically by the icon/tooltype arrangement of AddXAMem (when it's placed in your WBStartup drawer). Under later versions of AmigaDOS, this software call is not necessary and the memory will autoconfigure at memory address 8 000 000 (hex).

OPTIMIZATION NOTE: You will get somewhat faster AmigaDOS operation if you "call" SetXA from your Startup-Sequence Script rather than using the icon technique described above. Write the following line in your Startup-Sequence on the line following the Setpatch line:

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            SETXA ADDMEM
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See your AmigaDOS manual for information on editing your Startup-Sequence. For maximum speed, you may wish to use AutoXA instead of the AddMem call. See the AutoXA.Readme file on the diskette.

The only active use you need make of SetXA is when you physically change your system (change out the cpu or fpu to different speed chips or add or change memory). SetXA can be run from the command line using keywords or (most easily) from the Workbench by double-clicking its icon. Information about the XA is held in an EEPROM (Electrically Erasable Programmable Read-Only-Memory). SetXA can read the settings in this EEPROM and edit them when you change your system. Do NOT however, arbitrarily or experimentally change your EEPROM settings. You may cause the XA to malfunction. Your EEPROM has been initialized by PARAVISION with the correct settings relevant to the configuration of the product at that time. These settings are displayed as "Factory Settings". If you or your dealer has added or changed hardware, the settings will have to be modified and these modifications will be reflected by the listing under "Current Settings".
The SetXA keywords are as follows:

CPU 68030 -a regular, MMU-bearing 68030 is installed

CPU 68EC030 -an EC030 is installed (no MMU)

CPUSPEED *n* -a CPU of speed n MegaHertz is installed; allowable values for n are 25, 33, 40, and 50.

RAM *n* -a SIMM of n size (in megabytes) is installed. Allowable values for n are 0,1,2,4,8,16,32,64, or 128

FPU -record which type of FPU (math chip) is installed. Permissible entries are: none, 68881, and 68882

FPUSPEED *n* -record the clock speed of the FPU. Allowable values are: 20, 25, 33, 40, 50, and 60.

RAMSPEED *n* -the installed RAM is rated at n speed (in nanoseconds). Allowable values are 40,50,60,70, or 80.

CYCLES *n* -set the minimum access cycles for the RAM to n cycles. Do not change this to a value lower than that calculated by the program. Overdriven RAM will cause errors to occur.

ADDMEM -Add XA RAM to the system (if not already present). This command is NOT written to the hardware.

SHOW -Display the current values stored in the EEPROM. This command is not written to the EEPROM.

When using the Workbench to run SetXA, exiting via the SAVE button writes your selections to the EEPROM.

TROUBLESHOOTING

M1230 XA is tested thoroughly before it is shipped. But even the most reliable devices can have problems occasionally. If your M1230 XA should appear not to function properly, consider the following checklist:
1. Are your jumpers properly set?
2. Are all chips correctly installed and firmly seated in their sockets? Is the M1230 XA board firmly seated on the Amiga card edge?
3. Do you have a PCMCIA "credit card" peripheral installed? Does your system work correctly without it?
4. Does your M1230 XA work without other peripherals attached to the Amiga (external floppies, etc.)? Make sure your IDE hard drive has a MaxTransfer setting of 65536 or less (an IDE firmware limitation in many drives).
5. Is your power supply on a properly grounded outlet? If you also have an internal hard disk installed by you or your dealer, make sure your power supply is strong enough to support both the drive and the XA. The standard (25 watt, non-HD1200) power supply is NOT strong enough.
6. If you have problems with a particular piece of software, have you discussed it with the software publisher?
7. Have you tried running your system without background utility software (i.e., running from an "out-of-the-box" Workbench disk without any modifications)?
8. If you're having clock problems, do you have a second clock installed on your system?
9. If you are getting floating point errors, be sure that your math chip is running at its rated speed and is not overclocked.

If you have worked your way through the above checklist and are still experiencing problems, see your M1230 XA dealer. Alternatively, you may call PARAVISION Technical Support, but only after working through the checklist. Please be sure to make a note of your serial number and board revision number.

DESIGN CREDITS

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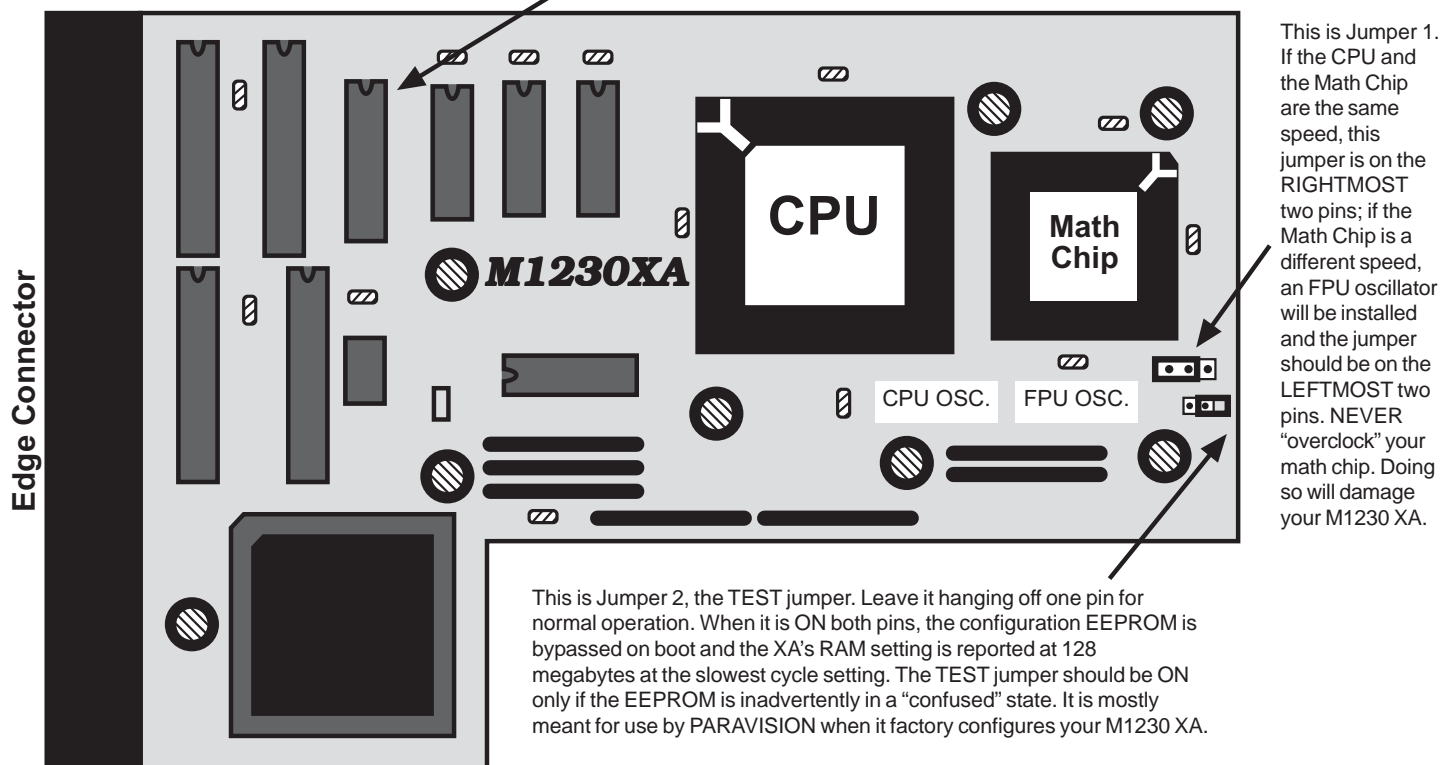Documentation and Packaging: Redmond Simonsen

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PARAVISION M1230 XA Installation Diagram

This is the real time clock chip; remove it if you have another clock present (on your motherboard for example)

CPU SIDE OF BOARD

This is Jumper 1. If the CPU and the Math Chip are the same speed, this jumper is on the RIGHTMOST two pins; if the Math Chip is a different speed, an FPU oscillator will be installed and the jumper should be on the LEFTMOST two pins. NEVER "overclock" your math chip. Doing so will damage your M1230 XA.

Edge Connector

CPU

Math Chip

M1230XA

CPU OSC.   FPU OSC.

This is Jumper 2, the TEST jumper. Leave it hanging off one pin for normal operation. When it is ON both pins, the configuration EEPROM is bypassed on boot and the XA's RAM setting is reported at 128 megabytes at the slowest cycle setting. The TEST jumper should be ON only if the EEPROM is inadvertently in a "confused" state. It is mostly meant for use by PARAVISION when it factory configures your M1230 XA.

This is your clock battery. If you ever need to replace it, be sure the plus side "+" is facing outwards. Use a CR 2032 or its equivalent.

This is the "keyed" side of the SIMM socket

+
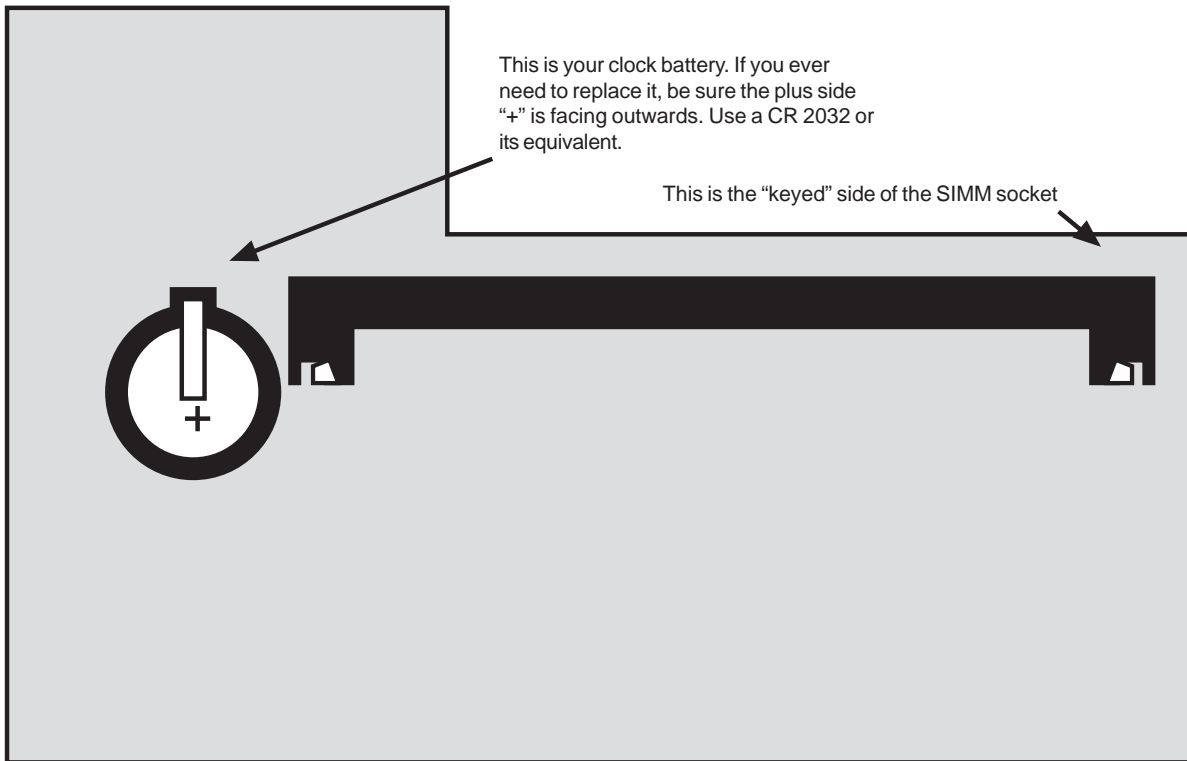
RAM SIDE OF BOARD

If you install new or different components yourself, please keep the following in mind:
1. Never run your CPU or your FPU at speeds higher than their rated speeds. You may get away with it for a while but in the long run you will damage your XA and void your warranty.
2. Be very sure that you have the correct type of SIMM module.
3. If you have a hard disk and only a 25 watt power supply, you may need a heavier power supply.
4. When changing components, you will need to change the EEPROM settings.

M1230 XA Specifications

CPU Clock Speeds Supported: 50MHz 68030 installed as standard. M1230 XA is also available with either a 33MHz 68030 or 40MHz EC030 (EC-no MMU).

CPU: Motorola 68882 math chip; PGA (Pin-Grid-Array) component. FPU can be matched to same-speed FPU or run at a different speed by resort to a separate oscillator.

Target System: Amiga 1200 Personal Computer.

Installation: Internal to Amiga 1200; resides on the 150-pin card edge connector. User or dealer installable.

Compatibility: Designed for general compatibility with all Amiga system software; AmigaDOS system 3.0 and later.

Memory Support: Supports the addition of a single, optional, 32 bit wide, 72-pin SIMM (Single Inline Memory Module). SIMMs are available in sizes from 1 megabyte up to 128 megabytes, single or double sided. This provision for industry-standard SIMM support insures that the M1230 XA will always be useable with state-of-the-art memory technologies. M1230 XA provides the biggest memory space available on the Amiga 1200.

Memory SIMM Types: 72-pin "wide-body" SIMM organized N-megabytes x 32 bits (the four megabyte SIMMs used in the Amiga 4000 and in Paravision's MBX 1200z are compatible with M1230 XA). Memory speeds from 40ns to 80ns are supported. The SIMMs used in the M1230 XA are available from numerous third party suppliers (i.e., they are not an expensive and limited proprietary SIMM-type). Typical name-brand SIMM: MT16D232 (eight megabytes) from Micron. SIMM socket is first-quality, professional metal-latch type for ease of insertion and secure contact with no breakage-prone plastic "ears".

Realtime Clock Calendar: An Epson RTC 72421B clock/calendar backed by a long lasting, user replaceable lithium battery cell (CR 2032), is supported. Addressable via the AmigaDOS Time utility.

System Compatibility and Mapping: RAM is autoconfigured under AmigaDOS 3.1 or software configured under 3.0. RAM can be withheld from the free memory list (for test purposes) via a jumper. RAM maps at hex-8 000 000 (and thus does not compete with PCMCIA peripherals). CPU and Math chip can operate without installed memory. The realtime clock is totally compatible with AmigaDOS; no additional software is required.

Software: Includes MBRTest-2, a comprehensive diagnostic program for Amiga memory and SetXA, a configuration utility to read and write to M1230 XA's EEPROM.

Applications: Useful in any speed, memory, and/or math intensive application such as animation, ray-tracing, morphing, scientific calculation, and image processing.

Power Consumption: 500 milliamps (approximate).

Configurations Available: Available with or without the 68882 installed, without memory or with any of the eight possible SIMM sizes.

SOME XA QUESTIONS (and Answers). Edition 1.0

1. MMU; what is it? MMU is short for Memory Management Unit. Basically it is logic built into a standard 68030 which permits an area of memory to be remapped via software (that is to say, have its logical address show up in a different physical location).

2. MMU; what good is it? Although an MMU is not required by the Amiga Operating System nor by Amiga application software, it can be useful. Software developers may need an MMU in order to run Commodore's Enforcer program (a debugger) or to run the UNIX operating system. Non-developers can use the MMU to remap the Kickstart ROM-based software into 32 bit wide memory for faster execution and to run third party virtual memory managers.

3. "EC" in 68EC030 -What does it mean? It does *not* stand for "EConomy" as some may think; it stands for Embedded Controller (the main use of the EC030 is as an Embedded Controller for laser printers).

4. 32-BIT MEMORY AND SPEED: why is it faster? Whenever M1230 XA (or any other accelerator) has to talk to CHIP memory or 16-bit wide PCMCIA memory on the Amiga, it must slow down to bus speeds to access that memory. The speed of the Amiga 1200 bus is about 14MHz (about 9.5 megabytes per second). When XA RAM is available, most memory accesses will be to that RAM at "local" bus speeds (i.e., basically the speed of the 68030). In addition to the higher speed of the memory access, TWICE as much data is affected per access compared to PCMCIA memory since the local bus is twice as wide as the Amiga PCMCIA bus.

5. A MATH CHIP; what is it? A math chip (or Floating Point Unit or FPU) is a companion chip for the main processor which takes over the execution of mathematical functions and speeds them up greatly. The greatest speed benefit can be seen in floating point math and trigonometric functions (sines; cosines, etc.).

6. A MATH CHIP; why do I need one? If your doing anything involving a lot of floating point math or trig functions, you need a math chip. On the Amiga, ray-tracing is a typical application which benefits greatly from a math chip. A speed of execution increase of two to four times would be typical if the ray-tracing code is compiled to take advantage of the math chip. Some floating point operations (such as sines and cosines) are dozens of times faster and more accurate.

7. SETXA EEPROM SETTINGS; what are they? These are completely explained in the documentation Operating Instructions. Basically, this is the configuration information for XA The EEPROM replaces about 6 jumper blocks.

8. FASTROM -what's the advantage? The CPU FASTROM command (in AmigaDOS) lets you *remap* a "clone" of the Kickstart ROM (via the MMU in the 68030) into a 512k block of the XA's memory. The operating system runs much faster running from wide RAM than from ROM. The disadvantage is that 512k of your wide memory is reserved for this remapped Kickstart.

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